

WHAT IS CLAIMED IS:

1. A probe carrier, characterized by comprising
a single-stranded DNA probe immobilized to a carrier
having a thin film containing (111)-oriented single
5 crystal gold formed thereon through a sulfur atom.

2. A probe carrier according to claim 1,
wherein surface unevennesses of the thin film
containing (111)-oriented single crystal gold are 0.5
10 nm or less per μm^2 .

3. A probe carrier according to claim 1,
wherein the sulfur atom interposed between the
carrier and the single-stranded DNA probe is formed
15 as a functional group of the single-stranded DNA
probe.

4. A probe carrier according to claim 1,
wherein the single-stranded DNA probe has a thiol
20 group as a functional group.

5. A probe carrier according to claim 1,
wherein an ink jet method is used to apply the
single-stranded DNA probe to the carrier upon
25 immobilizing the single-stranded DNA probe to the
carrier.

6. A probe carrier according to claim 1,
wherein a method in which the carrier is immersed in
a gold complex solution to form a gold single crystal
thin film on the carrier is used as a method of
5 forming the thin film containing the (111)-oriented
single crystal gold.

7. A probe carrier according to claim 1,
wherein the thin film containing the (111)-oriented
10 single crystal gold is used as an electrode.

8. A probe carrier according to claim 1,
wherein the thin film containing the (111)-oriented
single crystal gold can be applied with a voltage.
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9. A method of producing a probe carrier having
a single-stranded DNA probe immobilized to a carrier
having a thin film containing (111)-oriented single
crystal gold formed thereon through a sulfur atom,
20 the method comprising the steps of:

forming the thin film containing (111)-oriented
single crystal gold on the carrier; and

immobilizing the single-stranded DNA probe to
the thin film through the sulfur atom.
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10. A method of producing a probe carrier
according to claim 9, wherein surface unevennesses of

the thin film containing the (111)-oriented single crystal gold are 0.5 nm or less per μm^2 .

11. A method of producing a probe carrier
5 according to claim 9, wherein the sulfur atom interposed between the carrier and the single-stranded DNA probe is formed as a functional group of the single-stranded DNA probe.

10 12. A method of producing a probe carrier according to claim 9, wherein an ink jet method is used to apply the single-stranded DNA probe to the carrier upon immobilizing the single-stranded DNA probe to the carrier.

15 13. A method of producing a probe carrier according to claim 9, wherein the method in which a carrier is immersed in a gold complex solution to form a gold single crystal thin film on the carrier
20 is used as a method of forming the thin film containing the (111)-oriented single crystal gold.

14. A method of producing a probe carrier according to claim 9, wherein the thin film
25 containing the (111)-oriented single crystal gold comprises a patterned gold single crystal film.

15. A method of producing a probe carrier according to claim 14, wherein an electron beam or ion is applied to the carrier for the patterning.

5 16. A method of evaluating a probe carrier, characterized by comprising observing and inspecting a form of the probe carrier produced by the method according to claim 9 through a scanning probe microscope.

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 17. A method of detecting a target nucleic acid using a probe carrier having a single-stranded DNA probe for the detection of the target nucleic acid, characterized in that the probe carrier is the probe
15 carrier of any one of claims 1 to 8.

 18. A method of detecting a target nucleic acid according to claim 17, wherein the thin film containing the (111)-oriented single crystal gold is
20 used as an electrode and the target nucleic acid is detected by electrochemical measurement using the electrode.

 19. A molecular device manufactured by using a
25 thin film containing (111)-oriented single crystal gold as electrodes and interconnecting the electrodes by using a molecular chain typified by DNA.